



Focus Group IPM for brassica

Starting Paper

Tasks of the focus group

Stocktaking of the state of the art of practice, including a summary of problems and issues:

- identify (types of) pests and diseases relevant for Brassica for different EU regions;
- compare methods between different specialty crops and, particularly, between specialty crops and rapeseed;
- compare existing IPM methods from the cost-effectiveness point of view.

Stocktaking of the state of the art of research, including a summary of possible solutions for the problems listed:

- list ongoing IPM experiments for Brassica;
- list existing IPM practices (including soil-borne) for Brassica and indicate where improvement is needed.

Identify needs from practice for further research:

- prepare a gap analysis indicating where new solutions need to be found;
- identify priorities for further research actions.

Priorities for innovative actions:

- suggest potential practical operational group projects to test new IPM methods for Brassica;
- suggest potential projects of practical operational groups and other project formats to test new IPM methods for Brassica.



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BACKGROUND INFORMATION

Brassica species

The genus *Brassica* belongs to the *Brassicaceae* (also called *Cruciferae*) or mustard family. The *Brassica* genus contains many important crop species which provide edible roots, leaves, stems, buds, flowers and seeds (Rakow, 2004). The origin of the different *Brassica* species is presented in Figure 1. Economic important Brassica crops belong to the species *B. oleracea* ($n=9$), *B. rapa* (also called *B. campestris*, $n=10$), *B. napus* ($n=17$), a species derived from interspecific crosses between *B. oleracea* and *B. rapa*, and *B. juncea* ($n=18$), a species derived from interspecific crosses between *B. rapa* and *B. nigra* ($n=8$). Economic important Brassica species can be divided in Brassica vegetables, which predominantly belong to the species *B. oleracea* and *B. rapa* and the Brassica oilseeds, which belong to the species *B. napus* and *B. rapa*.

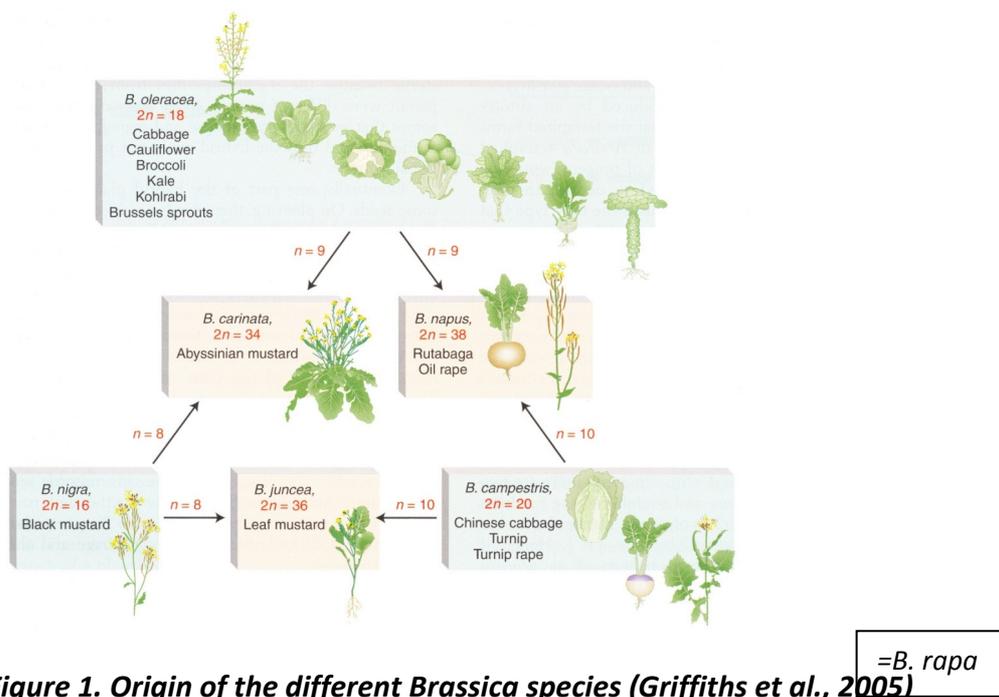


Figure 1. Origin of the different Brassica species (Griffiths et al., 2005)



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The most important Brassica vegetables and oilseeds grown in Europe are listed in Table 1.

Table 1. Economic important Brassica crops in Europe

Latin name	Common names		Major producing countries*
<i>Brassica oleracea</i>			
var. acephala	kale, borecole, grünkohl, boerenkool		
var. capitata -rubra	headed cabbage, sluitkool -red cabbage		Turkey, Germany, Hungary, Poland, Benelux, UK, France, Scandinavia
-alba	-white cabbage		Romania, Poland, Germany, Greece, Spain, Turkey, UK, Italy, Benelux, France
-conica	-pointed cabbage		
var. sabauda	savoy cabbage, col de savoya, savooiekool		UK, Italy, Spain, Hungary, France, Germany, Poland, Benelux
var. gemnifera	Brussels sprouts, coles de Bruselas, chou de Bruxelles, rosenkohl, spruitkool		Belgium, Netherlands, UK, Poland



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var. botrytis	cauliflower, coliflor, chou-fleur, blumenkohl, bloemkool		France, UK, Italy, Belgium, Spain, Portugal, Turkey, Germany, Belgium, Hungary, Netherlands
var. italica	Broccoli, broccoli, brécol		Spain, UK, Italy, Poland, Benelux, Germany, France, Turkey, Portugal, Greece
var. gongylodes	Kohlrabi, chou-rave, koolrabi, German turnip		

Latin names	Common names		Major producing countries*
<i>Brassica rapa</i> (= <i>Brassica campestris</i>)			
var. pekinensis	Chinese cabbage, Chinese kool, Chinakohl, chou chinois		
var. chinensis	Paksoi, pak choi, Chinese mustard		
var. rapa	Turnip, knolraap, rübe, navet		



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ssp. oleifera	Turnip rape, rapeseed, raapzaad		Poland, Sweden, UK, Finland
<i>Brassica napus</i>			
ssp. oleifera	Oilseed rape, koolzaad, colza, raps		France, Germany, UK, Poland, Czech Republic, Sweden, Hungary, Bulgaria, Denmark, Slovakia, Romania, Sweden
	Rutabaga, swede, yellow turnip, nabicol, koolraap, kohlrübe		
<i>Brassica juncea</i>			
	Brown mustard, leaf mustard, indian mustard, moutarde brune, brauner senf, sareptamosterd		

*According to Eurostat and Groentemagazine

Brassica oilseeds, predominantly *B. napus* (Table 2 and 3), are produced on more than 6 million ha in Europa. The major producing countries are Germany, France, Poland and the UK. Turnip rape (*B. rapa*) is mainly grown in Estonia, Latvia, Lithuania, Poland, Scandinavia and the UK (Table 4).

Brassica vegetables, predominantly *B. oleraceae* are produced on about 430,000 ha in Europe. More than half of the areal is situated in East Europe. The most important Brassica vegetables are cauliflower, broccoli and white cabbage. France is the most important producer of cauliflower, while Spain is the most important broccoli producer. White cabbage is the most important Brassica vegetable in East Europe with Hungary, Romania and Poland as major producing countries (Table 5).



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Brassica diseases and pests

Brassica species are susceptible to a number of fungal and bacterial diseases (Table 6). The most important soilborne diseases on oilseed rape are probably clubroot, caused by *Plasmodiophora brassica*, Sclerotinia stem rot, caused by *Sclerotinia sclerotiorum* and Verticillium wilt, caused by *Verticillium longisporum*. These diseases are favoured by short rotation. Other major diseases include black leg or Phoma leaf spot/ stem canker, caused by *Leptosphaeria maculans* and light leaf spot, caused by *Pyronepeziza brassicae*. The most important pests on oilseed rape are listed in Table 8 and include slugs, the cabbage stem flea beetle, the peach-potato aphid, the pollen beetle, stem and seed weevils and the brassica pod midge. Problems with weeds mainly occur at emergence, when the crop is still small.

Besides the diseases listed above, Brassica vegetables are susceptible to a number of important leaf diseases including powdery mildew, black spot, ring spot, white blister rust and downy mildew. Moreover, bacterial diseases such as black rot, caused by *Xanthomonas campestris* pv. *campestris* can cause destructive diseases on Brassica vegetables (Table 6). Major pests on Brassica vegetables are listed in Table 7 and include the cabbage root fly, aphids and caterpillars. All Brassica species also suffer from wildlife damage, mainly birds and rodents. A list of Latin and common names of the most important diseases and pests is given in Table 9.

Integrated Pest Management (IPM)

Integrated pest management or IPM is a broad-based approach in which all available pest control techniques are considered in order to grow a healthy crop with the least possible disruption to agro-ecosystems. In this definition a pest is any organism that damages or interferes with our crop plants and can be a weed, an invertebrate (insect, mite, snail), a nematode, a bird, rodent or other mammal, or a pathogenic microorganism (fungus, bacterium, virus). IPM is based on accurate pest identification and typically includes regular crop monitoring to determine if, when and what treatments are needed for effective control. A combination of cultural, physical, biological and chemical strategies is employed to keep pests low enough to minimize economic crop loss. The aim is to control the pest, not to eradicate the pest.

Cultural practices aim at reducing pest establishment, reproduction, dispersal and survival, for instance by crop rotation, irrigation or drainage, the appropriate use of fertilizers, organic soil amendments, etc. Other important measures are the use of pest- and pathogen-free planting



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material, and the use of resistant varieties.

Mechanical and physical practices aim at killing a pest directly or make the environment unsuitable for it. Examples are the use of nets or traps, mulches for weed management, and steam sterilization of soil to kill soilborne pathogens.

Biological control is the use of natural enemies—predators, parasites, pathogens, and competitors—to control pests and their damage. Natural enemies can be introduced or natural populations can be stimulated.

Chemical control is the use of pesticides. In IPM, pesticides are used only when needed and in combination with other approaches for more effective, long-term control. Also, pesticides are selected and applied in a way that minimizes their possible harm to people and the environment.

A good example of IPM for Brassica spp. in Australia can be found at the following link:

http://www.daff.qld.gov.au/_data/assets/pdf_file/0006/72465/brassica-best-practice-integrated-pest-management-guide.pdf

A Guide to Integrated Pest Management for Brassica
- Insect Pest, Disease, Virus, Nematode and Weed Control
Edited by Robert Dimsey, David Carey and Sally-Ann Henderson (2010)